

## Self-grading multiple-choice tests with Google Docs

I don't have much love for multiple-choice tests — either for administering them or for taking them — but as a teacher, the format was sometimes required by my administration, and was sometimes useful for simple prove-that-you-read-it quizzes. Google Docs didn't help me love them, but it did help me never grade them.

Here's how:

### CREATING THE FORM (Test or Quiz)

(1) Go to [Google Docs](#). If you don't have a google account, you'll have to set one up, but if you already use Gmail or GReader or any of the other apps, you just need to log in.

(2) In the upper-left corner, open the *Create new* drop-down menu and select *Form*.

(3) You should now have a blank form. This will be your quiz. Give it a name where it says *Untitled form* and any additional text that will help your students (your name, class name, instructions, or whatever) in the box beneath it.

(4) Open the selection box for *Question Type* and select *text*. Next to *Question Title*, type "Name:" and check the box that says *Make this a required question*. (You might want to add a question for class period or ID number, too. Also, add one for email address.)

(5) At the top-left of the page, click *Add question* and select *Multiple choice* to create the first test question. (You can choose others types of questions, too, of course. I often had a few open-ended paragraph response questions, but these require old-fashioned review and grading.)

(6) Type your question in the box next to *Question Title*. I recommend **numbering it** there, too. For example: "1) What is 5+5?" Add some *Help Text* if you want to (it'll appear smaller and lighter beneath the question).

(7) Type the first possible response to the question in the *Option 1* box. Click *add 'Other,'* or press Return to add additional options, or click in the "ghosted" second option to make it appear, and do the same thing again to add as many choices as you want. Be sure to include the correct answer as one and only one option!

(8) At the top-left of the page, click *Add question* to create the next question. Repeat steps (6) and (7).

(9) Repeat step (8) to make all the questions you want. If you want to change one you've already made, hover the mouse over it so that the pencil icon appears to the right, and click on that icon. You can also drag questions up and down to rearrange their order.

(10) When you're finished, click *Done* on the active question, and click *save* on the top-right. If you click on *More actions* and *Edit confirmation*, you can edit the message that is displayed after the completed quiz is submitted. (Or you can leave it with the default message.)

(11) You can jazz up your test by adding a theme to it. Click on *Theme* in the top left corner. You have 97 to choose from. Click *save* on the top right.

(12) Before any students take the quiz, take it yourself. Email it to yourself. Click on *Email this form* in the top right corner. Fill in your email address and uncheck the box beside *Include form in email*. Hit *send*. Open your email and click on the link. Enter "ANSWER KEY" (or whatever you like) as your name and all the right answers. Click *Submit*. [This is a good way to find typos, also!]

## Getting it to your students:

(1) Once you've finished the test, you have three options to give people access to your quiz. a) You can click on the **Email this form** at the top of the screen, then fill out a list of recipients in the box provided. b) You can click on More Actions, then choose **Embed** from the pop-up. You can then copy this code and put it in on a webpage or a facebook page. c) Finally, you have a link to the published form on the bottom of the page. You can make it more manageable at [tinyurl.com](http://tinyurl.com) and write it on the board.

(2) After students take the quiz, go back to [Google Docs](https://docs.google.com). You should see your quiz as one of your saved documents. Click on it and you'll find all responses in a spreadsheet. The date and time of each response is stamped in column *A* (so you can have deadlines if you want them, and students can't fake it), names in column *B*, etc. and all of your questions in subsequent columns.

(Once the deadline passes, if you don't want to accept late submissions, you can click on *More actions* and select *Stop accepting responses*.)

## Making the test self grading:

Now, if you want Google to do all the grading for you (and of course you do), it gets slightly trickier. But it's not too hard, and after you've done it once, it's easy.

### Easy Way\*\*:

1) After students take quiz, go to the spreadsheet. Click on *Insert* and choose *Script*.

2) Click on *Education* on the left side. Then, find *Flubaroo* from the list on the right and click *Install*. Click *Authorize* when prompted and the program will quickly download. It is now showing on your toolbar beside the word **Help**. [Note: You can do these two steps before the students take the quiz.]

3) [This step must be done **after** you and your students take the quiz.] Click on *Flubaroo*. Choose *Grade Assignment*. It will walk you through a few steps to determine the correct answers.

4) Your quiz is graded and an email has been sent to the student or parent informing them of the grade!

\*\*Taken from: Screencast by Josh Dumas: <http://www.screencast-o-matic.com/watch/cX12oeql5>

### Technical Way:

(1) Once a student has submitted their responses, click on the cell *in the same row as their responses* but to the right of the last one. So, for instance, since the last question of my sample quiz is in column *D*, and my first student response is in row *3*, I'm clicking on cell *E3* (same *row* as the student, next *column* to the right after the last question).

(2) In the cell, enter a formula like this one: `=arrayformula(sum(C$2:E$2=C3:E3))`

*Yours will be a little different from this one.* The `=` sign indicates that what follows is a formula. The `arrayformula()` function indicates that whatever is wrapped inside its parentheses will have array inputs; the `sum()` function takes a sum of the arguments in its parentheses (or in this case, the number that return "true"); and the last stuff is the array that we're actually counting.

If none of that made sense, don't worry. This is what you need to know: the `C$2:E$2` means that the correct answers are in the cells between and including *C2* and *E2*. If your quiz has many more questions, and the answers go from *C2* and *ZZ2* (or whatever), you'll need to change that part of the formula to `C$2:ZZ$2`. Don't forget the dollar signs! (They'll be explained below.)

The `C3:E3` means *that the answers of the student whose answers are in this row* are in the cells between and including *C3* and *E3*. You'll want to make these letters match the letters you used in the previous paragraph, since if the answers go from *C* to *ZZ* for the correct answer row, they should for the student, too. You'll want the numbers to be one higher than what you used in the previous paragraph, since this student's answers will be one row beneath the correct answers. Make sure you don't have the dollar signs here!

So the formula  $\text{sum}(C\$2:E\$2=C3:E3)$  is asking how many cells between  $C2$  and  $E2$  are equal to the corresponding cells between  $C3$  and  $E3$ . (We need to wrap all this in the  $\text{arrayformula}()$  function since these ranges of cells make up array data.)

If you don't understand or care about any of this, just enter  $\text{=arrayformula(sum(X\$:Y\$\#X@:Y@))}$  (without quotation marks) in the cell, replacing  $X$  with the column letter of the first correct answer,  $Y$  with the column letter of the last correct answer,  $\#$  with the number of the row with the correct answers, and  $@$  with the number of the row with the first student's answers (probably one greater than the number of the row with the correct answers).

(3) Now, once you've entered that formula and hit enter, the cell should have the total number of that student's answers that match the correct answers. When that cell is highlighted, there should be a little blue square in its lower-right corner. Once all the students have submitted their answers, click on that square and drag it down to the last student's row. This will copy the formula you entered into each row. (And since we had the  $\$$ -sign in  $C\$2$  and  $E\$2$  (or wherever the answers were), those cell locations will be unchanged in all the new formulae; since we didn't have the  $\$$ -sign in  $C3$  and  $E3$  (or wherever the first student's answers were), those cell locations will automatically increment for each row.)

(Unfortunately, you do have to wait for students to submit the answers before you drag these formulae down. If you drag them down into blank rows, the form will recognize that those rows are already in use and subsequent submissions will skip them.)

(4) If you want Google Docs to automatically calculate percentages, click on the cell to the right of the first student's "total correct" cell (in other words, to the right of the one we just added a formula to). Enter an  $=$  sign, click on the student's "total correct" cell, enter a  $/$  sign, and enter the total number of questions. So it should look something like this:  $\text{=E3/2}$ . This divides the student's number of total correct answers by the number of possible correct answers. When you hit enter, the cell will have a  $1$  if the student got 100%, a  $0$  if the student got a 0%, and a decimal for anything in between. If you click the *Edit* tab, and, while the cell is highlighted, click the *Format* drop-down menu, and then select one of the percentage options, the cell will be displayed as a standard percentage. You can do the drag-down procedure as before to copy this formula for all the other students as well.

Once you know how to do this, it can save an enormous amount of time. I kept a blog for each class period, and posted the agenda and assignments every day. I would sometimes make a "take home quiz" like this and post the link. Other times, when I was required to give a multiple choice test at school, I would make it like this and administer it in the library or computer lab. And, of course, this same method can be easily modified for regular gathering of contact information on the first day of school (bonus: student email addresses will be copy-and-pastable), for learning-style inventories, for parent surveys, or just about anything else.

And I saved all that time for grading essays!

From: [rpollack.net](http://rpollack.net) (<http://rpollack.net/2008/09/self-grading-multiple-choice-tests-with-google-docs/>)



### Open Ended Questions:

(Does not work with Flubaroo)

1) We'll add a few more columns to finish up. We'll need a column for points someone would get since it's open ended. That will allow me to give the student points if they get that question partially right. I'll call this column Open Ended Points. Then, I'll add another column to calculate the Correct Points from the other questions. I'll call that Correct Points. Finally, I'll add a final column for the grade.

2) This is the hard part. To calculate whether a question was filled in correctly, I need to award a point to a student if their answer matches the answer in the key. We'll need to use a spreadsheet IF statement. The IF statement works like this  $\text{IF}(\text{CELLID2}=\text{CELLID1}, \text{TRUEVALUE}, \text{FALSEVALUE})$ . So, if the answer on the current cell matches the answer on the key, then the spreadsheet will give the TRUEVALUE, otherwise it will give the FALSEVALUE.

So, for our first question the formula would look like this: =IF(C3=\$C\$2,1,0). The = sign at the beginning of a formula tells the spreadsheet software that this is a special cell that needs to be calculated. Notice something peculiar about our cell references. The first cell reference C3 is a **normal cell reference**. The second cell reference is a bit different \$C\$2. This is an **absolute cell reference**.

The cool thing about formulas in spreadsheets is that they can be copied and pasted into other cells. When you have cell references in them, the spreadsheet application will try to make the formulas automatically adjust to the relative position of the cells. If we had another student fill out this form and copied the formula from this cell to the one below, The spreadsheet would attempt to check to see if the answers would match not the key, but the cell right above the current cell. Since we don't want this to happen, the second cell reference is absolute. When the formula is pasted, the answers will always be checked against the first test answers (the key).

To calculate the Correct Points, we need to add the value of each correct answer. Here's what that formula would look like:

=IF(C3=\$C\$2,1,0)+IF(D3=\$D\$2,1,0)+IF(E3=\$E\$2,1,0)+IF(F3=\$F\$2,1,0))

Here's a couple of caveats about doing it this way. For a checkbox question, the student must click all of the correct checkboxes in order for the question to count. There is **no points for partially correct answers**.

Also, for questions that are fill in the blank like the question about the IAB, the answer **must match exactly**. Some students, might have a problem remembering how to spell Bureau or make a spelling mistake. Those won't count. Of course, you can go through this spreadsheet and when you're going through and analyzing the Open ended questions, you can retype their answers to make sure they match and they get the points, but I would mention that they must get everything perfect or it might not count.

The formula to calculate the final grade will take all of the points from the Correct Points column and add them to the open ended points. That formula looks like this:

=ROUND((H4+I4)/(\$H\$2+COUNTA(\$C\$2:\$F\$2))%,0)

This formula adds up the previous two columns, then compares that to column \$H\$2 (the points I am awarding for open ended points in this quiz, plus the number of columns between \$C\$2:\$F\$2), which is a fancy way of calculating the total amounts of points on this quiz. Normally, this calculation would give you a number between 0 and 1, but if we add the % at the end, it creates a percentage result which converts our normal results to a number between 0-100 %. Finally, we wrap this around a ROUND function. The round function works like this ROUND(VALUE, ROUNDTODECIMALS). By giving it a 0 value in the ROUND to decimals, we make this result round to whole numbers.

3) Once your students are done taking the test, check their open ended questions and award them open ended points. Then, select the two calculated cells (I3 and J3 in this case) and click on the bottom right of the two cells (there will be a small blue rectangle there) and drag them down to the end of the list of students who have completed the test. Their grades will calculate automatically.

It's always a good idea to manually verify a couple of test grades with a calculator to make sure your formulas are correct. I used this formula to give my students a final exam and it worked out great. They could obviously look for the answers online so I gave them a limited time to work on the final. I had my grades done immediately after they took the test and I didn't have to spend hours grading them.

For screen shots with these directions:

<http://planetoftheweb.com/components/promos.php?id=534>

Other resources:

<http://www.screencast-o-matic.com/watch/cjXeqwnDe>

\*Screencast with directions on inserting formulas